

CLAIMS

What is claimed is:

5

1. A method for forming a semiconductor device, comprising:

providing a package device having a first heat spreader, a package
substrate overlying the first heat spreader, and a cavity extending
through the package substrate and into the first heat spreader;
attaching a first die to the first heat spreader within the cavity;
attaching a second heat spreader to the first die;
forming a plurality of electrical connections between the first die and
the package substrate; and
encapsulating the electrical connections, the first die, and at least a
portion of the second heat spreader.

2. The method of claim 1, wherein the plurality of electrical connections
comprise wire bonds from the first die to the package substrate.

3. The method of claim 1, further comprising:

after attaching the first die to the first heat spreader, attaching a
second die to the first die, wherein the second heat spreader is
attached to the second die.

4. The method of claim 3, further comprising:

forming a plurality of electrical connections between the second die
and the package substrate,

and wherein encapsulating further comprises encapsulating the second die.

5 5. The method of claim 4, further comprising forming at least one electrical connection between the second heat spreader and at least one of the first or the second die.

10 6. The method of claim 1, further comprising forming at least one electrical connection between the second heat spreader and the first die.

15 7. A semiconductor device, comprising:
a first heat spreader;
a cavity extending into the first heat spreader;
a first semiconductor die within the cavity; and
a second heat spreader overlying the first semiconductor die.

20 8. The semiconductor device of claim 7, further comprising a package substrate overlying the first heat spreader, wherein the cavity extends through the package substrate.

9. The semiconductor device of claim 8, further comprising a plurality of solder balls overlying the package substrate.

25 10. The semiconductor device of claim 8, further comprising a plurality of electrical connections between the first semiconductor die and the package substrate.

11. The semiconductor device of claim 10, further comprising an encapsulation layer encapsulating the plurality of electrical connections, the first semiconductor die, and at least a portion of the second heat spreader.

5

12. The semiconductor device of claim 7, further comprising:
a second semiconductor die within the cavity, overlying the first semiconductor die and underlying the second heat spreader.

20200429.02001

10

13. The semiconductor device of claim 12, wherein the second heat spreader is connected to the second semiconductor die via a first die attach and the second semiconductor die is connected to the first semiconductor via a second die attach.

15

14. The semiconductor device of claim 7, further comprising a die attach connecting the second heat spreader to the first semiconductor die.

15. The semiconductor device of claim 7, wherein the second heat spreader is soldered to a metal layer overlying the first semiconductor die.

20

16. The semiconductor device of claim 7, wherein the second heat spreader comprises a first portion and a second portion, the first portion closer to the first semiconductor die than the second portion, and wherein the first portion has a first surface area and the second portion has a second surface area that is less than the first surface area.

25

17. The semiconductor device of claim 16, wherein the first portion and the second portion are contiguous portions of the second heat spreader.

18. The semiconductor device of claim 16, further comprising:

5 an electrical connection coupled to the first portion of the second heat spreader and the first semiconductor die.

19. A semiconductor device, comprising:

10 a semiconductor die having a first surface and a second surface, the semiconductor die comprising active circuitry within the first surface; and

a heat spreader connected to the first surface of the semiconductor die.

20. The semiconductor device of claim 19, wherein the heat spreader is
15 connected to the first surface via a die attach layer.

21. The semiconductor device of claim 19, wherein the heat spreader is soldered to a metal layer overlying a portion of the first surface of the semiconductor die.

20 22. The semiconductor device of claim 19, further comprising:

a second heat spreader underlying the second surface of the semiconductor die.

25 23. The semiconductor device of claim 22, wherein the first heat spreader provides a first heat dissipation path from the first semiconductor

device, and the second heat spreader provides a second heat dissipation path from the first semiconductor device.

24. The semiconductor device of claim 22, further comprising a second
5 semiconductor device underlying the second surface of the semiconductor device and overlying the second heat spreader.

25. The semiconductor device of claim 24, wherein the second surface of
10 the semiconductor device is attached to the second semiconductor device via a first device attach layer, and the second semiconductor device is attached to the second heat spreader via a second device attach layer.